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ABSTRACT

Tests of achievement in economics have a variety of uses. Their principal role is to evaluate how successful students have been in learning economics on a particular course, either overall or in particular aspects of economics. They may also serve to provide evidence about the efficacy of specific teaching materials and/or strategies. Finally, they may be used as diagnostic instruments to assess the progress and difficulties of individual students. A standardized instrument for use in British schools is not currently available. The United States, on the other hand, has developed such tests for assessing the whole range of students, from primary through to university. This paper describes the process of trying out the U.S.-developed Test of Economic Literacy (TEL) in the United Kingdom in May 1989. The development and norming of this test in the United States is discussed, and reservations are expressed about the use of multiple choice tests in general to measure economic understanding. Finally, the United Kingdom trials are reported, norming data are presented in 12 tables, and some comparisons are drawn with the U.S. data. A 9-item bibliography is included. (JB)

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THE TEST OF ECONOMIC LITERACY: STANDARDIZATION IN THE U.K.

by

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The Test of Economic Literacy: Standardization in the U.K.

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David J Whitehead and Tony Halil

Summary

This paper describes the trialling of the American *Test of Economic Literacy* in the U.K. in May, 1989. The first section reports the development and norming of this test in the U.S.A. in 1985/6. Next, various reservations are expressed about this specific test and about the use of multiple choice tests in general to measure economic understanding. Finally, the U.K. trials are reported, norming tables are provided, and some comparisons are drawn with the American data.

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Introduction

This paper describes the trialling of the American *Test of Economic Literacy* in the United Kingdom in May, 1989. The first section reports the development and norming of this test in the United States in 1985/6. Next, various reservations are expressed about this specific test and about the use of multiple choice tests in general to measure economic understanding. Finally, the U.K. trials are reported, norming data are provided, and some comparisons are drawn with the U.S. data.

Tests of achievement in economics have a variety of uses. Their principal role is to evaluate how successful students have been in learning economics on a particular course, either overall or in particular aspects of economics. They may also serve to provide evidence about the efficacy of specific teaching materials and/or teaching strategies. Finally, they may be used as diagnostic instruments, in order to assess the progress and particular difficulties of individual students.

A standardized instrument for use in British schools is not currently available. Admittedly, various tests of economics comprehension were developed by Lumsden in the late 1960s, and trialled in 1970 and 1973 in many U.K. schools. (Lumsden, 1980, p 18). These tests were well ahead of their time, and contained some profoundly intriguing questions. Norming data were published for these tests (Lumsden, 1980, pp172-191). The only other U.K. test for which norming data have been published is the 1976 Inter-board Multiple Choice Economics Test, which was used for the Summer 1976 'A' Level Economics Examination by a consortium of three examination boards. The use of this test in a research study conducted between 1980 and 1984 (Whitehead, 1986, pp24-32) highlighted a problem whose resolution has not yet been attempted by any test developer. This concerns whether it is valid to use the same test for groups who have not studied the subject as for those who have. Such tests are normally devised for respondents who have already studied the subject, and the difficulty of questions is set appropriately for those who have studied economics to the specified level. It may be the case that students who are about to embark on an economics course, or even students who have never and will never formally study economics, do nevertheless have some economics understanding, but that the test they are given (which has been designed for use at the end of a course), does not enable them to reveal it. (Whitehead, 1986, p28). They may be puzzled by the use of technical terms, or the problems posed may be too difficult for them to solve, whereas easier or more graduated questions might have permitted them to reveal their modicum of economic understanding.

Compared with the sparse work done in the U.K. on developing standardized instruments for testing economic understanding, the United States has developed such tests for assessing the whole range of students, from primary through to university. It is now 25 years since the first *Test of Economic*

Understanding was published. The purpose of this test was to help school systems assess gains in economic knowledge by the use of a standardized, nationally normed instrument. It also fostered a substantial body of economics education research (mostly published in the *Journal of Economic Education*). In 1977, the Joint Council on Economic Education published the *Master Curriculum Guide in Economics* (Hansen et al., 1977), and this was paralleled by the development of a new testing instrument, the *Test of Economic Literacy* (TEL), which was published in 1978/9. (Soper, 1978, 1979). The *Framework* document was revised in 1984 (Saunders et al., 1984). The major differences between the 1977 and 1984 versions are in the fundamental and macroeconomics concept listings. (See Appendices 1 and 2). Also, more emphasis is given in the 1984 test to international economics concepts. Subsequently, the TEL was revised in 1985. Two-thirds of the questions in the 1986 version of the TEL are completely new; the rest have been modified. The entire test was subject to several careful reviews in order to make certain that most 12th grade students would be able to understand the questions. Details of the norming procedure are given in the *Examiner's Manual* (Soper and Walstad, 1987, p2). The final norming version of the revised TEL consists of two 46-item forms, with 15 items common to each form. The authors maintain that both forms are at a high school reading level, and that 'a strong case can be made that the revised TEL is a valid measure of senior high school student understanding of basic economic concepts'. (Soper and Walstad, 1987, p2)

The developers of the test present several arguments to defend its validity. (Soper and Walstad, 1987, pp18-19). To establish content validity, the Test Development Committee first devised a large number of items, which were scrutinised by a National Advisory Committee, to ensure that the instruments possessed face validity. Content validity is determined by comparing the test questions with the content judged to be important. Clearly, there may be no unique standard of validity for the test. If exception is taken to the test content or the objectives as expressed in the content/cognitive matrix, then the test would not be judged a valid instrument. Finally, the TEL has significant construct validity, that is, the test performs well with different groups of students and in the expected direction. For example, students who have studied economics scored 4.96 points higher than did students who had not studied economics. (<0.001).

The TEL was normed in the United States in late 1985 and early 1986, using a large cross section of the nation's high schools, selected as an invitational sample of representative high schools, stratified by census region, by urban, suburban or rural location, and by type of course (economics, consumer economics or social studies). Data were gathered on 8,205 students in May, 1986. The sample was subdivided into categories by student sex, grade level, student IQ level, race/ethnic origin, type of community, census region, course type, family income level, and exposure to economics instruction.

Since TEL Form A was the version used for obtaining norming data for the UK, only the statistical information for that test is reported here.

Table 1: Aggregate Statistics for TEL Form A Norming Sample, Spring, 1986

(numbers in brackets are the standard deviations).

Number of students 4,235
Cronbach alpha 0.87
Standard error of
measurement 3.06
Percent of students with
economics 74.5
mean overall 22.06
(8.33)
mean with economics 23.33
(8.45)
(n=3,153)
mean without economics 18.37
(n= 1,082).

The standard error of measurement (SEM) is an estimate of the amount of variation that can be expected in a test score. A raw score of 23 on a test with an SEM of 3.0 indicates that we can be about 67 per cent certain that a person's 'true' score lies in a range from 20 to 26, or that we can be 95 per cent certain that the 'true' score lies in the range 17 to 29. The smaller the SEM, the more accurate the test is as a measuring instrument.

Another measure of overall test reliability is Cronbach's alpha, a statistic yielding a coefficient with a value ranging from zero to 1.00; the higher the coefficient, the greater the statistical reliability of the test. The Cronbach alpha of 0.87 indicates that there is good internal consistency among items and that the test is therefore a highly reliable measure of economic achievement.

Table 2 presents the norms obtained for 11th and 12th grade students with and without economics instruction, in percentiles. Percentile ranks allow comparisons to be made among students in different groups. For example, an 11th grade student with economics who obtains a raw score of 29 is performing at the 82nd percentile for this group, but a score of 29 for a 12th grader with economics is performing at only the 71st percentile for this group.

Table 2: Percentile norms by grade and economics instruction: TEL Form A

	Grade 11		Grade 12	
Raw Score	with econ	without econ	with econ	without econ
46				
45				
44				
43				
42			99	
41			98	
40	99		97	
39	98		97	
38	98		96	
37	97		94	
36	95		92	99
35	94		90	97
34	93		87	97
33	91		84	95
32	90	99	81	94
31	88	98	78	93
30	84	97	75	91
29	82	96	71	90
28	82	95	68	86
27	76	94	64	83
26	73	91	61	80
25	70	89	57	78
24	67	88	53	76
23	64	84	50	73
22	61	80	46	71
21	57	78	42	66
20	54	74	38	61
19	49	71	35	56
18	45	66	30	51
17	40	59	26	43
16	34	51	22	37
15	29	45	18	30
14	23	36	15	25
13	18	28	12	20
12	13	22	8	15
11	8	16	5	10
10	5	11	4	5
9	2	8	2	4
8	1	3	1	2
7		2		0
6		0		

Table 3 shows the average percentage of correct responses for each item for students with and without economics, and also the overall item discrimination coefficient. Note that the statistics comprise both year 11 and year 12 students in both the 'with' and 'without economics' categories.

Table 3: Percentage of correct responses and discrimination power: TEL Form A

Item	Correct Answer	Corrected item-total correlation (N=4,235)	percent correct with economics (N=3,153)	percent correct without econ. (N=1,082)
1	A	.19	89.5	82.5
2	D	.37	59.2	36.1
3	C	.36	53.5	29.6
4	B	.26	45.2	39.4
5	D	.32	38.4	27.2
6	C	.31	51.5	42.7
7	D	.47	72.2	55.5
8	C	.26	64.8	61.0
9.	D	.40	47.6	34.1
10	A	.42	47.8	34.0
11	A	.27	42.3	36.2
12	A	.43	72.8	54.7
13	B	.40	60.4	46.8
14	B	.37	65.0	47.7
15	B	.38	62.2	51.8
16	D	.43	62.2	50.2
17	D	.33	41.8	27.7
18	A	.44	77.7	66.5
19	A	.44	71.5	58.6
20	A	.30	36.5	29.2
21	C	.29	63.9	52.7
22	B	.10	32.8	28.2
23	C	.26	39.5	33.5
24	C	.45	64.5	47.2
25	C	.21	31.9	20.4
26	D	.44	49.5	38.6
27	A	.35	44.8	31.6
28	C	.29	46.5	38.8
29	A	.38	40.7	28.8
30	D	.39	62.7	53.0
31	C	.31	42.4	34.0
32	B	.08	19.3	17.2
33	C	.13	36.4	30.2
34	D	.46	45.5	26.4
35	C	.14	33.7	30.3
36	A	.51	59.0	45.3
37	D	.49	56.3	41.0
38	B	.06	36.4	34.6
39	B	.32	53.0	40.2
40	C	.36	52.1	41.9
41	C	.43	54.5	42.6
42	B	.26	47.7	40.9
43	B	.18	32.8	28.8
44	B	.27	41.6	33.3
45	B	.32	48.7	35.6
46	A	.26	35.7	30.4

Table 4 shows the percentage of all students responding to each of the four options for each of the 46 items on TEL Form A, and the percentage of omitted responses. Such a table could prove very useful to teachers. For

example, if a substantial number of a teacher's students answered B when the correct response was D, she would be alerted to study distractor B to try to uncover the reason for the common mistake. This in turn might lead to improved teaching or an examination of how the textbook presents the concept.

Table 4: Percentage Response to each alternative: TEL Form A (N=4,235).

Item	A	B	C	D	Blank
1	88*	2	7	3	0
2	7	15	24	53*	1
3	14	26	47*	12	1
4	14	44*	21	21	1
5	7	40	18	35*	1
6	18	13	49*	19	1
7	7	12	13	68*	0
8	22	19	64*	4	1
9	16	20	20	44*	0
10	44*	13	19	23	1
11	41*	20	28	11	1
12	68*	9	12	10	1
13	8	57*	22	12	1
14	9	61*	22	8	0
15	20	60*	9	11	1
16	11	12	18	59*	0
17	14	29	18	38*	0
18	75*	11	10	4	0
19	68*	17	10	5	0
20	35*	10	33	22	0
21	11	14	61*	13	1
22	22	32*	31	15	1
23	12	29	38*	20	1
24	14	12	60*	13	1
25	11	41	29*	19	1
26	16	20	16	47*	1
27	41*	23	19	16	1
28	18	20	45*	17	1
29	38*	24	20	17	1
30	16	12	10	60*	1
31	19	29	40*	11	1
32	17	19*	37	27	1
33	22	16	35*	25	2
34	18	18	22	41*	1
35	21	24	33*	20	2
36	56*	20	14	9	1
37	20	15	10	52*	2
38	13	36*	31	18	2
39	16	50*	18	14	2
40	15	22	50*	12	2
41	20	16	52*	11	2
42	16	46*	24	12	2
43	16	32*	20	30	3
44	25	40*	20	14	2
45	21	45*	18	13	2
46	34*	17	22	25	2

Table 5 provides descriptive statistics for various groups within the norming sample.

Table 5: Descriptive statistics for various groups within the norming sample: TEL Form A

	with economics			without economics		
	Mean	Std. Dev.	Number	Mean	Std. Dev.	No
By gender						
Females	22.68	7.95	1412	18.12	6.14	475
Males	23.97	8.83	1516	18.84	7.19	453
By grade level						
Grade 11	21.26	7.99	633	17.20	5.91	408
Grade 12	24.04	8.47	2168	19.78	7.14	463
By IQ Level						
Low	17.78	7.01	511	15.52	4.52	250
Middle	24.35	7.24	518	19.13	6.03	285
High	31.04	7.31	446	24.08	7.35	148
By Race/Origin						
White	24.55	8.36	2297	18.69	6.79	811
Black	19.72	7.60	378	14.91	4.44	104
Hispanic	21.37	7.88	54	16.53	7.15	17
Other	22.76	8.54	136	18.20	6.71	45
By type of community						
Rural	19.41	7.76	438	17.66	6.20	280
Suburban	26.01	8.14	1248	18.29	6.75	491
Urban	23.81	8.56	929	21.17	6.67	93
By Region						
Northeast	24.58	8.04	519	22.37	7.24	146
South	20.75	7.89	622	17.36	5.83	319
North Central	23.32	8.66	1529	17.66	6.83	533
West	25.32	8.08	489	19.79	5.34	84
By Course Type						
Economics	23.57	8.46	2585	NA	NA	NA
Consumer Economics	21.70	7.99	309	18.70	7.14	263
Social Studies	22.85	8.69	259	18.27	6.57	819
By income level						
Low	20.64	7.00	594	18.37	5.88	99
Middle	25.30	8.54	1715	17.39	6.14	675
High	24.31	9.49	309	24.61	6.66	118
All students	23.33	8.45	3153	18.37	6.71	1082

Significant results include the finding that there are differences in economic understanding by intelligence levels, but that exposure to an economics course makes a significant difference at each intelligence level. This effect provides further evidence for the construct validity of the TEL: it is not simply a proxy measure of intelligence. The test authors stress that such categorical breakdowns should be treated with caution, since some of the sub-group cell sizes are small. In addition, these breakdowns are by single characteristics without control over other characteristics. To control for confounding caused by other factors requires the use of more advanced statistical procedures.

In a further study based on the norming sample data, the authors obtained information about how the sample performed on particular aspects of economics. (Walstad and Soper, 1988, pp251-6). The sample consisted of 3,031 students who took both the pre-test in January, 1986 and the post-test in May, 1986. Of these students, 50 per cent were taking an economics course that used a published ,high school economics text and focussed instruction on basic economic concepts. Students taking consumer economics comprised 19 per cent of the sample. The remaining 31 per cent of the students were taking various social studies courses, such as U.S. history or government. The mean percentage correct responses were calculated in each of the four major concept clusters defined in the *Framework*. The worst levels of performance were on macroeconomics and international economics items. For example, students scored 47 per cent correct on macroeconomic items and 48 per cent correct on international economics items compared to 58 per cent correct on fundamental items and 56 per cent correct on microeconomic items.

Regression analysis of the overall TEL scores was conducted to identify factors that contributed to economic understanding. Significant results include the following. The type of course a student takes has a significant effect on the level of economic knowledge. Students who have completed an economics course score 4.1 points higher on the TEL than social studies students whose teachers do not include economics instruction in their courses. Secondly, the more education a teacher has in economics, the more student learning of the subject increases. This result provides support for the value of teacher education in economics as a means of improving the economic literacy of high school students.

Discussion of the Test of Economic Literacy

It is necessary at this stage to express some reservations about the development of the TEL, and its use as a research instrument. Students taking part in the norming trial were asked whether they had taken a course in economics. Unfortunately, it is very difficult to interpret responses to this question. Some students may have taken a two semester course in economics, others only a short course, whilst some might have been half way through a course when the test

was taken. Some of the 12th grade students may have taken an economics course in the 11th grade, but they may not have stated this in the response sheet. Also, there would be considerable variation in the level of economic understanding which students would be expected to attain in different courses.

No comment is made in the Examiner's Manual about whether the control group was equivalent in relevant respects to the experimental group.

Reservations might be expressed about the facility and discrimination indices for TEL Form A (Soper and Walstad, 1987, p15). According to the authors, 'Items were retained which showed reasonable difficulty levels and the ability to discriminate between students of greater or lesser economic understanding.' (op. cit. p2) In the U.K., 0.4 is regarded as a reasonable benchmark for the facility index. But even taking just the respondents 'with economics', eight questions had a facility index lower than this. In other words, even amongst students who had studied economics, about 1 in 6 questions was answered incorrectly by two-thirds of the respondents. Even more concern might be expressed about the discrimination indices, which measure the point-biserial correlation between individual test items and the total test score. See Table 3). The authors regard any index below 0.2 as indicative of a poor discriminator, which is rather a generous interpretation. If the stricter (and more commonly deployed) criterion of a 0.4 cut-off point is used, (for the group 'with economics') then 24 items would have to be rejected. Even if items with a discrimination index of greater than 0.35 had been used, 9 items would have been cut. In other words, a substantial number of test items had the characteristic that those who performed well on the test as a whole did badly on them, and vice versa.

The test developers argued that the TEL had content validity in the American context. Consideration of the Content/Cognitive Matrix does not indicate that the TEL would be inappropriate for use with British Advanced Level Economics students. The main content categories of the test: fundamental economic concepts; microeconomic concepts; macroeconomic concepts; and international economic concepts, reflect substantially the core of the British Advanced Level Economics syllabuses. Restriction of items to knowledge, comprehension, application, analysis and evaluation of economic concepts ensures that no country-specific material renders the test invalid. However, such a judgment would not be acceptable in German-speaking nations. Research conducted in Switzerland, Austria and West Germany showed that though university economics experts agreed that on average the TEL did measure economic' literacy, more than half thought that essential aspects were missing. (Beck and Krumm, 1989, pp11-12). Objectors to this finding might point out that it is not clear that there is a universally acceptable definition of economic literacy in these countries, and that the fact that certain university professors do not think that the test is a valid way of assessing

students' economic literacy is not necessarily a convincing argument that the test is invalid. It would also be possible to take exception to several individual items, on the ground that the correct answer is not at all obvious, or is at least disputable. However, this problem is to some extent alleviated by the injunction to students to choose the 'one best answer', even though 'in some cases more than one answer may appear to be correct'. (Test of Economic Literacy: Form A).

While the TEL is acceptable on grounds of content validity for use in the U.K., reservations may still be expressed about the exclusive use of a multiple choice test to assess economic literacy. After all, current British economics examinations at Advanced Level use at least three modes of examining: the essay paper, an objective test and data response questions, in order to obtain a valid assessment of a student's economic understanding. But standardised tests at this level normally rely entirely on the multiple choice test, for good reasons. The use of such a test permits inclusion of all the basic principles within a short period of time (40 minutes). Administration of the test to large numbers of students is facilitated by the ease of marking computer readable response sheets. As Lumsden explains, if agreement is reached on the validity of the test questions, 'it would be possible to evaluate and compare performance of individual students or groups of students without the ambiguity and high costs associated with essay examination marking.' (Lumsden, 1980, p63).

But while such a test eliminates subjectivity in marking, it does not of course preclude all possible ambiguity or disagreement. Experienced teachers all have evidence of ambiguous questions used in actual Advanced Level examinations, despite extensive pre-testing. It is intriguing that there was only one letter sent by a teacher to the research team, suggesting that for several items in the test, the correct response was at least arguable: and this was from a non-economics teacher!

Norming Procedure for the United Kingdom

The TEL has two forms, A and B, with 15 common or 'anchor' items. Because economics courses at the U.S. senior high school level last usually only for a semester, it would not be appropriate to use the same test as both pre- and post-test, so two versions were developed, for use in experimental settings. If such a test were used for a similar purpose in the U.K., this procedure would not be necessary, since economics courses normally last two years. So it was decided to obtain norming data for only one of the forms: A. This was chosen since it was normed (in the U.S.) on a slightly larger sample than Form B. (N=4,235)

Half of the items had to be modified for the British context, but most only because of differences in American and British spelling. Other changes simply reflected the use of different words for the same concept: for example

'comprehensive school' was substituted for 'public high school', and 'trade unions' for 'labor unions'. In no case was the conceptual core of the question altered at all.

It was decided to adopt the same sampling procedure as that used by the test developers, namely to choose a representative sample from the target population. On 15th December, 1988, letters were written to Chief Education Officers to ask whether the maintained secondary schools in their authority might be approached to seek permission to trial the test in their schools. The following local education authorities were approached: ILEA , all the outer London boroughs, and the counties of Bedfordshire, Berkshire, Buckinghamshire, , Hampshire, Kent, Herts, Essex, Cumbria and Northumberland. No responses were received from five local authorities. Apart from ILEA, all those who responded agreed to permit individual headteachers to be approached to ask if they would be willing to participate in the norming trials.

Subsequently, letters were written to Headteachers on 1st February, 1989, asking whether they would permit their school to take part in the standardization trials for the test. Altogether, 250 maintained schools were approached, and 160 agreed to take part in the research (though three schools replied too late to be included). On the same date, a similar letter was written to the Headteachers of 52 independent secondary schools in London and the Home Counties. Of these, 29 agreed to participate in the test standardization. So in total, 189 schools agreed to participate, and 113 declined to do so (N=302).

The main reason why Headteachers declined to participate in the trials was that Advanced Level Economics was not taught at their school. Other reasons cited included: students had already taken part in numerous surveys; there were only a very small number of economics students; there were so many economics students that the testing would be hard to manage; the school was already involved with pre-testing for the examination board; staffing difficulties; and students were unwilling to participate.

On 27th February, 1989, a letter was written to all the Heads of Economics Departments at the trial schools. They were informed that their Headteacher had agreed to their taking part in the trialling of the Test of Economic Literacy. The TEL would be administered to students of Advanced Level Economics in both the first and second year of the 6th form (equivalent to the 11th and 12th grades in American schools), as well as to an equal number of students who had not studied economics. Teachers were asked to supply the numbers of students studying Economics to Advanced Level in both years, so that the correct number of test booklets could be distributed to each school.

On 10th April, parcels of test booklets were posted to schools, together with an explanatory letter. Teachers were asked to administer the test by the end of April, 1989. The test was to be given under supervision, during class time. Forty

minutes were allowed for test completion. Students were requested to complete personal details on the test answer sheet: the name of the school, name, whether they were in the first or second year sixth, and whether or not they were studying Advanced Level Economics. Teachers were asked to send the answer sheets back in four groups: 6th year AL Economics, 7th year AL Economics, and 6th and 7th year non-AL Economics.

Of the 189 schools which had agreed to take part in the research, (of which 186 were circulated, since 3 responses came too late) responses were received from 162 schools, of which 138 were maintained schools and 24 independent. (See Table 6).

Table 6: Distribution of schools taking part in Standardisation

	No. of Schools agreeing to take part in trials	No. of Responses received	No. of schools declining to participate
Independent	29	24	23
Outer London Boroughs	67	56	46
Home Counties	75	67	29
Rural Counties	18	15	15
Total	189	162	113

In order to facilitate international comparisons, attempts were made to match the American sample as closely as possible. For example, students of the same age were chosen to participate in the trials. Also, the sample was divided into groups 'with' and 'without' Economics. The U.S. sample was divided into male and female respondents, and it was also possible to categorise in this way in the U.K. sample. However, in several respects the American sample could not be replicated. One problem is that a much higher proportion of American than British students stay on at school beyond the age of 16. On the whole, the attrition of British students post-16 consists of those of average and below-average intelligence. Certainly those who are studying Advanced Level subjects are considerably above average in intelligence. In contrast, the American school samples will have contained an ability distribution more closely resembling the normal. While in principle it would have been possible to administer an IQ test (as happened with the American sample, and as did Lumsden in 1970/3), it was considered that schools would be unlikely to accept such a burden of external testing at the time of year when the trialling took place: just before the public examinations. The American tests also asked students about their ethnic background, and teachers about the socio-economic background of their students. The former would be an inadmissible question for several local authorities in Britain, and the latter was not considered likely to have any valid meaning in the context of quite heterogeneous British schools. The U.S. data are stratified by region (Northwest, South etc) and by type of community (rural, suburban etc). Again, it would be difficult to match these descriptors in

the U.K. So it was decided for convenience to administer the test principally to schools in London and the surrounding counties, since it was not hypothesized that any significant difference would be attributable to such categoric variables. Nevertheless, two 'rural' counties were included (Cumbria and Northumberland) to see if any such systematic differences did emerge. The American study distinguished between four types of course taken by students: Economics, Consumer Economics, Social Studies, and none of these. In order to establish a clear-cut distinction between those who were studying Economics and those who were not, it was decided to include in the 'with Economics' group only those studying Advanced Level Economics.

Finally, the British sample could be divided in a way that was not relevant for the American group: into those attending independent and maintained schools.

In late May and early June, 1989, Heads of Economics Departments returned the response sheets. In a number of cases, they commented on the difficulty of persuading students who were not studying economics to spare the time to answer the test. It is not possible to say with any degree of confidence that such non-Economics students took the test at all seriously, or indeed that they were properly supervised. The American authors adopt a rather sanguine view of the earnestness with which such students might treat such a test. Other teachers remarked on the difficulty of the questions for students who have never studied Economics. In contrast, the test was considered by some teachers to be rather more elementary than the level expected of second year Advanced Level Economics students in their external examination. Another problem in making international comparisons is that British students of Economics at 18+ are taught to a higher level than probably anywhere else in the world (the top 25 per cent of the ability range taught for 3 to 4 hours per week for two years).

Descriptive Statistics for the TEL in the United Kingdom

Responses were received from 7549 students. The answer sheets were machine-markable, but much time had to be spent checking that each sheet was properly filled in, and personal details had to be manually coded so that they could be read by the computer.

Of the 7549 respondents, 4381 were in the Lower Sixth (58%) and 3168 were in the Upper Sixth (42%). Those studying economics totalled 4311 (57%), while those who were not studying the subject summed to 3238 (43%). Female respondents totalled 3361 (44.5%), male 4182 (55.4%). (6 missing cases). Independent schools represented 14.8% of the total sample (24 ex 162 schools), while independent school respondents totalled 1205 (16%), maintained sector students totalling 6344 (84%).

Table 7 provides aggregate statistics for the norming sample.

Table 7: Aggregate Statistics for TEL Form A Norming Sample. May, 1989

Number of students	7549
Cronbach alpha	0.87
Standard error of measurement	2.78
Percentage of students with economics	57
mean overall	30.09(7.78)
mean with economics 1 year	31.84 (5.82) n=2169
mean with 2 years economics	36.87(4.74) n=1814
mean without economics 1st year sixth	23.53(6.40) n=1713
mean without economics 2nd year sixth	25.62(6.12) n=1084

Table 8 presents the norms obtained for Lower and Upper Sixth students who either have or have not studied economics.

Table 8: Percentile norms by first and second year sixth and economics study: TEL Form A.

	1st year sixth		2nd year sixth	
Raw score	with econ	without econ	with econ	without econ
46				
45			99	
44			98	
43	99		95	
42	98		90	
41	97		84	
40	94		76	
39	92		67	99
38	87	99	58	98
37	83	98	50	97
36	77	97	41	96
35	71	96	33	94
34	65	95	26	92
33	59	93	21	90
32	51	91	16	86
31	45	88	12	82
30	38	85	9	78
29	32	81	6	73
28	25	78	5	68
27	21	73		62
26	17	67	3	56
25	13	62	2	49
24	10	55		43
23	8	49	1	37
22	7	43		31
21	5	38		25
20	4	33		20
19	3	28		15
18	2	23		11
17		18		8
16	1	14		5
15		10		4
14		8		3
13		5		2
12		3		
11		2		1
10		1		

Table 9 shows the average percentage of correct responses and internal consistency of the test by class and whether students had studied economics.

Table 9: Percentage correct responses and internal consistency (Class by economics)

		N=2169		N=1713		N=1814		N=1084	
		1st year				2nd year			
		econ.		non-econ.		econ.		non-econ.	
Item	Correct Answer	item-total corr.	%correct	item-total corr.	%correct	item-total corr.	%correct	item-total corr.	%correct
1	A	.14	88.9	.18	74.8	.19	94.2	.16	72.5
2	D	.23	94.0	.23	47.9	.20	98.5	.22	51.2
3	C	.27	79.6	.20	23.8	.29	93.6	.17	24.5
4	B	.27	68.2	.30	46.3	.25	82.1	.24	51.1
5	D	.20	50.9	.24	29.7	.11	58.1	.23	40.4
6	C	.30	70.1	.23	51.1	.24	81.6	.17	54.5
7	D	.28	85.5	.28	67.5	.21	94.1	.29	74.3
8	C	.16	70.9	.17	70.1	.17	76.4	.19	75.1
9	D	.20	90.6	.35	62.0	.23	97.8	.32	67.1
10	A	.25	73.5	.35	52.7	.17	78.1	.32	62.4
11	A	.18	76.1	.22	66.9	.08	79.7	.20	71.8
12	A	.20	86.1	.26	68.4	.18	96.6	.18	71.9
13	B	.30	86.5	.33	69.6	.20	92.5	.32	77.3
14	B	.17	83.8	.25	60.4	.23	89.3	.26	63.4
15	B	.21	71.2	.21	59.6	.29	82.0	.21	65.3
16	D	.18	75.8	.29	56.7	.15	82.6	.33	64.4
17	D	.26	70.1	.28	45.0	.21	82.9	.32	50.0
18	A	.20	91.5	.29	83.0	.19	95.1	.27	88.3
19	A	.21	86.0	.26	75.4	.19	90.6	.26	80.3
20	A	.33	51.4	.32	38.5	.31	64.5	.31	49.7
21	C	.24	67.8	.18	52.0	.31	78.1	.24	54.2
22	B	.25	49.6	.09	24.3	.20	72.7	.11	25.7
23	C	.27	73.6	.34	55.9	.21	84.3	.25	66.7
24	C	.28	87.6	.31	73.4	.24	95.0	.26	78.5
25	C	.31	50.3	.14	15.2	.25	63.3	.15	15.3
26	D	.29	83.1	.33	69.8	.24	93.1	.29	77.5
27	A	.27	74.7	.29	42.8	.27	88.6	.24	48.5
28	C	.26	56.3	.16	41.5	.26	77.6	.21	45.9
29	A	.28	67.7	.26	46.1	.23	80.5	.30	50.8
30	D	.20	91.0	.20	81.6	.19	95.9	.26	80.5
31	C	.14	53.3	.22	48.2	.01	60.5	.15	52.0
32	B	.23	19.5	.09	11.5	.25	36.2	.08	10.1
33	C	.21	45.3	.09	34.7	.25	64.8	.10	35.1
34	D	.26	69.1	.27	40.6	.25	86.6	.31	46.8
35	C	.06	26.7	-.08	21.4	.15	54.1	-.03	20.9
36	A	.28	86.9	.37	70.4	.20	93.6	.27	74.4
37	D	.34	82.6	.32	60.4	.30	92.3	.32	69.2
38	B	.09	30.2	-.02	27.8	.27	50.2	-.08	31.2
39	B	.24	75.1	.17	49.3	.26	87.9	.19	46.8
40	C	.24	66.1	.26	61.7	.20	76.1	.17	67.0
41	C	.25	64.7	.22	49.4	.29	78.8	.25	57.1
42	B	.29	77.8	.24	59.1	.29	86.8	.31	66.1
43	B	.25	35.6	.18	25.2	.26	54.9	.19	32.2
44	C	.08	46.7	.09	41.6	.02	47.9	.04	40.6
45	B	.30	81.6	.30	58.2	.26	92.1	.29	66.0
46	A	.24	71.2	.15	41.5	.24	85.2	.14	47.5
Alpha		0.77		0.77		0.74		0.76	
Mean		31.84		23.53		36.87		25.62	
S.D.		5.82		6.40		4.74		6.12	
S.E.M.		2.79		3.06		2.42		3.00	

Table 10 shows the percentage of all students responding to each of the four options for the 46 items on TEL Form A, and the percentage of omitted (blank) responses.

Table 10: Percentage response to each alternative N=7549)

Item	A	B	C	D	Blank
1	83.5*	1.3	8.4	6.7	0.1
2	4.2	10.8	9.1	75.4*	0.4
3	19.9	15.2	59.4*	5.4	0.1
4	9.6	62.6*	8.4	18.8	0.6
5	3.0	24.8	27.3	44.7*	0.2
6	12.5	10.7	65.1*	11.4	0.3
7	3.1	8.0	8.1	80.5*	0.3
8	23.1	3.3	71.9*	1.4	0.3
9	6.8	5.7	6.4	80.7*	0.3
10	66.6*	5.9	11.6	15.2	0.6
11	73.5*	6.6	14.8	4.8	0.2
12	81.5*	4.3	5.3	8.7	0.2
13	2.9	81.7*	11.8	3.4	0.2
14	2.0	75.4*	18.4	4.0	0.1
15	11.9	69.2*	2.4	16.1	0.4
16	3.5	7.3	18.8	70.3*	0.2
17	9.8	15.0	11.9	63.0*	0.2
18	89.4*	6.1	3.0	1.3	0.2
19	82.9*	8.7	5.4	2.6	0.3
20	50.6*	3.7	11.8	33.5	0.3
21	13.3	11.0	63.9*	11.5	0.3
22	28.9	44.9*	14.7	11.1	0.4
23	4.1	13.2	70.0*	12.5	0.2
24	3.7	4.9	83.6*	7.6	0.2
25	10.3	38.8	38.4*	12.3	0.3
26	5.7	9.5	4.1	80.4*	0.3
27	64.9*	16.4	7.6	10.6	0.5
28	18.4	11.6	55.4*	14.3	0.3
29	61.3*	12.4	14.2	10.9	1.2
30	6.7	3.9	1.9	86.9*	0.6
31	4.9	35.7	53.1*	5.8	0.5
32	13.5	20.2*	61.5	4.4	0.4
33	26.9	7.9	45.5*	19.2	0.6
34	11.1	15.0	11.6	61.5*	0.8
35	18.2	20.6	30.9*	28.2	2.0
36	81.0*	7.2	7.8	3.2	0.8
37	11.3	9.5	2.5	75.9*	0.8
38	8.0	34.4*	20.9	35.4	1.3
39	8.7	65.9*	12.1	12.0	1.3
40	9.3	18.7	66.1*	4.6	1.3
41	16.1	7.2	61.5*	13.3	1.9
42	7.3	71.2*	14.5	5.3	1.8
43	4.8	36.4*	9.5	47.2	2.1
44	32.9	15.7	43.0*	6.0	2.4
45	8.8	73.3*	6.4	9.0	2.4
46	61.1*	6.2	10.0	19.8	2.8

* denotes correct response

Table 11 provides descriptive statistics for various groups within the norming sample.

Table 11: Descriptive statistics for various groups within the norming sample: TEL Form A

	With Economics						Without Economics					
	Year 1			Year 2			Year 1			Year 2		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N
By gender												
Females	30.32	5.87	883	36.08	4.63	722	22.43	5.90	918	24.69	5.74	500
Males	32.89	5.54	1286	37.40	4.75	1092	24.82	6.72	789	26.42	6.32	584
By School Type and Area												
Independent	32.44	5.59	289	36.66	4.46	274	24.64	6.35	209	25.39	6.52	136
London Boroughs	31.51	5.45	227	36.15	5.46	142	21.56	6.23	176	25.42	5.89	74
Home Counties	31.88	5.93	1480	37.09	4.66	1264	23.82	6.45	1158	25.83	6.12	745
Northern Counties	30.98	5.55	173	36.04	5.16	134	22.19	5.69	170	24.72	5.74	129

By Grade Level	With Economics			Without Economics		
	M	SD	N	M	SD	N
L6	31.84	5.82	2169	23.53	6.40	1713
U6	36.87	4.74	1814	25.62	6.12	1084

Table 12 presents the norms for male and female first year economics students, by percentile.

Table 12: Percentile Norms by Gender: First Year Economics Students

Raw Score	Female	Male
43		99
42	99	98
41	98	96
40	97	92
39	95	89
38	91	85
37	89	78
36	85	71
35	80	64
34	75	59
33	69	52
32	62	43
31	56	37
30	48	31
29	42	25
28	34	19
27	30	15
26	25	11
25	19	8
24	16	6
23	13	5
22	10	
21	8	4
20	5	3
19	4	2
18	3	
17		1
16	1	

Discussion of the U.K. results in relation to the U.S. Norming Data

The total number of respondents in the U.K. sampling frame for the standardization of TEL Form A compares favourably with the U.S. sample (7549 compared with 4235). The ratio of independent to maintained school students (1:5.25) approximates that for the total population at the age (1:4).

Comparison of Tables 1 and 7 shows an identical Cronbach alpha (0.87), and a improved standard error of measurement for the U.K. (2.78). While 75 per cent of U.S. students had studied economics, the standardization of the TEL in the U.K. emphasized the importance of the control group, and so the 'with economics' group represented only 57 per cent of the total sample.

The U.S. overall mean was reported in Table 1 as 22.06; the corresponding U.K. mean was 30.09. In other words, the U.K. sample scored on average 8 more correct responses than the U.S. sample. The U.S. mean for those 'with economics' was 21.26 for Grade 11 and 24.04 for Grade 12 (See Table 5). These figures compare with 31.84 for first year British students, and 36.87 for second year British students. So British students perform substantially better at both levels than do American students. This finding also applies to non-economics students, where the U.S. means are 17.2 and 19.78 for 11th and 12th Grades respectively, while the U.K. samples scored 23.53 and 25.62.

Table 8 provides percentile norms, which may be compared with similar statistics for the U.S. sample in Table 2. While an 11th Grade 'with economics' student in the U.S. who scores 29 is performing at the 82nd percentile there, a British student with the same score is only at the 32nd percentile. Only 29 per cent of U.S. 12th Graders with economics scored more than 29, compared with 94 per cent of U.K. Upper Sixth economics students.

It is remarkable that 57 per cent of U.K. Upper Sixth non-economics students perform better than the mean for U.S. <u>with</u>-economics students!

These higher ratings are reflected in the facility indices. For the U.K. 'with economics' sample, only 4 items had a facility index <0.4 in the Lower Sixth sub-group, and only 1 item in the Upper sixth sub-group (compared with 8 items for the U.S. 'with economics' sub-group.) The discriminatory power of individual items (see Tables 3 and 9) appear to be worse for the U.K. than for the U.S. sample. This will be investigated in a forthcoming paper.

Table 10 enables U.K. economics teachers to compare their own students' responses with the national norms. First, teachers may use the test diagnostically, For example, if students opt for a particular distractor, this indicates to the teacher what kind of misunderstanding is typical. Additionally, teachers may be able to identify pupil difficulties with respect to different areas of the syllabus, such as macroeconomics or microeconomics. To facilitate such analysis of individual

pupils' responses, item-based information is provided. A second use of the test is to monitor group progress, both with reference to the improvement in class means over time and compared with national norms. To this end, group normative information is provided.

Comparison of Tables 5 and 11 indicates that mean scores for males are higher than for females in both countries in all sub-groups. The regional subsamples (London Boroughs, Home Counties, and Northern Counties) show very little variation in mean scores, though in all cases the Home Counties means are the highest. Again, the independent school subsamples showed little deviation from the maintained sector means.

Comparing 11th and 12th Grade U.S. students with Lower Sixth and Upper sixth U.K. students reveals that in the U.S., the 'with economics' groups scored 21.3 and 24 respectively, while in the U.K., the corresponding means were 31.84 and 36.87. For the non-economics groups, the figures were 17.2 and 19.8 for the U.S., and 23.53 and 25.62 for the U.K.

Table 12 presents the percentile norms for Lower sixth economics students in May of their first year of study, by gender, so that teachers may compare their own students' results with these national norms.

Conclusion

The trialling of the U.S. Test of Economic Literacy in the U.K. in May, 1989 resulted in the establishment of norms for various subsamples of the school population. If the TEL is a valid instrument for measuring economic understanding, then the use of the norming tables presented in this paper will enable teachers to compare the performance of their own students with the relevant national sample, and take appropriate remedial action. Further papers will report detailed statistical analysis on the scale itself, and on the significance of the findings for the U.K. sample.

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APPENDIX I

TABLE 2. Five-Level Cognitive Taxonomy for the *Test of Economic Literacy*

Level	Objective	Operative Verbs	Emphasis
I Knowledge	To show that the student knows	list, recall, remember, tell define, identify, label, locate, recognize	recognition and recall—ability to remember facts in a form close to the way they were first presented
II Comprehension	To show that the student understands	explain, illustrate, describe, summarize, interpret, expand, convert, measure, understand, translate, extrapolate	grasp the meaning and intent of information—ability to tell or translate in own words
III Application	To show that the student can use what is learned	demonstrate, apply, use, construct, find solutions, collect information, perform, solve, use abstractions, choose appropriate procedures	use of information—ability to apply learning to new situations and real-life circumstances
IV Analysis	To show that the student perceives and can pick out the most important points in material presented	analyze, debate, differentiate, generalize, conclude, distinguish, organize, determine	reasoning—ability to break down information into component parts and to detect relationships of one part to another and to the whole
V* Evaluation	To show that the student can judge and evaluate ideas, information, solutions, procedures, and goals	compare, decide, judge, evaluate, conclude, contrast, appraise, develop criteria	criteria or standards for evaluation and judgment—ability to make judgments based on criteria or standards

Source: Adapted from Sally R. Campbell, *Consumer Education in an Age of Adaptation* (Chicago: Sears, Roebuck, 1971), p. 10.
*This is actually the *sixth* level of Bloom's original taxonomy. We decided to delete the *fifth* level ("synthesis") from the original schema, as it is difficult to assess with multiple choice questions and is not usually the focus of economics instruction. In Bloom's formulation, the emphasis in the "synthesis" category is on originality and creativity.

APPENDIX 2

TABLE 4. Content-Cognitive Matrix: TEL Form B

Content Categories	Cognitive Level*					No. of Questions	Percent
	I	II	III	IV	V		
Fundamental Economic Concepts						12	26.1
1. Scarcity		1, 3				2	
2. Opportunity cost/trade-offs			2		4	2	
3. Productivity		5, 6				2	
4. Economic systems	7					1	
5. Economic institutions & incentives	8, 9, 10, 11					4	
6. Exchange, money, & interdependence	12					1	
Microeconomic Economic Concepts						13	28.3
7. Markets & prices			13			1	
8. Supply & demand		14	15, 16		17	4	
9. Competition & market structure			18, 19, 20			3	
10. Income distribution	22	21				2	
11. Market failures		23				1	
12. Role of Government				24	25	2	
Macroeconomic Economic Concepts						14	30.4
13. Gross national product	26	27				2	
14. Aggregate supply		28				1	
15. Aggregate demand		30		29		2	
16. Unemployment				31		1	
17. Inflation & deflation				32, 33		2	
18. Monetary policy		34	35		38	3	
19. Fiscal policy		36		37, 39		3	
International Economic Concepts						7	15.2
20. Comparative advantage/barriers to trade			42	40, 41		3	
21. Balance of payments & exchange rates			44	43		2	
22. International growth & stability		45, 46				2	
Total No. Of Questions	8	14	10	10	4	46	
Percent of Total	17.4	30.4	21.7	21.7	8.7		100

*See Table 2.